<u>IN THE SPECIFICATION</u>

Please amend the paragraph bridging pages 2-3 of the Specification as follows:

Some tripod type constant velocity universal joints have the rollers mounted on cylindrical outer peripheries of their trunnions via a plurality of needle rollers. When an outer joint member and a tripod member transmit rotational torque with an operating angle, however, the trunnions tilt to make the rollers and the respective roller guideways oblique to each other. This produces a slide therebetween, giving rise to a problem that resistance here hampers the smooth rolling of the rollers and thereby increases induced thrust. Moreover, there is another problem that the resistance between the rollers and the respective roller guideways increases the slide resistance to axial relative displacements between the outer joint member and the tripod member. Such induced thrust and slide resistance contribute to the production of vibrations and noises from a car body, affecting the <u>Noise Vibration Harshness (hereinafter referred to as "NVH")</u> ~~NVH~~ performances of the motor vehicle. Typical automotive NVH phenomena associated with such induced thrust and slide resistance include the rolling of a moving car body and the vibrations of a car idling with its automatic transmission ~~at~~ <u>in the drive or</u> D range, respectively. The essence of solution to the automotive NVH problems consists in reducing the induced thrust and slide resistance in the joint. In general, induced thrusts and slide resistances in a joint tend to depend on operating angle of the joint. This tendency leads to a design limitation of prohibiting greater operating angles when, for example, a constant velocity universal joint is applied to an automotive drive shaft. Accordingly, reduction and stabilization of the

induced thrust and slide resistance are also desired for the sake of enhanced design flexibility of portions around the car axles.

Please amend the paragraphs extending from page 4, line 3 to page 6, line 7 of the Specification as follows:

a) The outer rollers are provided with outer peripheries of convex spherical shape (including both a "perfect spherical surface," having its center of curvature on the trunnion axis, and a so-called "torus surface," having its center of curvature off the trunnion axis toward the outer-diameter side) and inner peripheries of cylindrical shape, and the inner rollers are provided with outer peripheries of convex spherical shape, so that slides between the cylindrical inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers ~~(Japanese Patent Publication No. Hei 3-1529, etc.)~~.

b) The outer rollers are provided with outer peripheries of convex spherical shape (including both a perfect spherical surface and a torus surface) and inner peripheries shaped so as to make line contact with outer peripheries of the inner rollers, and the inner rollers are provided with the outer peripheries of convex spherical shape, so that slides between the inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers. Besides, the inner peripheries of the outer rollers are shaped so that load components toward the trunnion extremities are created at the contact positions with the outer peripheries of the inner rollers ~~(Japanese Patent Laid-Open Publication No. Hei 9-14280, etc.)~~.

c) The roller guideways are provided with flat surfaces, the outer rollers are with outer peripheries of cylindrical shape and inner peripheries of concave spherical shape, and the inner rollers are with outer peripheries of convex spherical shape, so that slides between the concave-spherical inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers ~~(Japanese Patent Applications Nos. Hei 8-4073 and 8-138335)~~.

d) In addition to the constitution c) above, the roller guideways and the axes of the trunnions are configured not to be parallel to each other at an operating angle of 0° ~~(Japanese Patent Laid-Open Publication No. Hei 11-13779)~~.

Also known as a tripod type constant velocity universal joint of this kind is the constitution e) in which: the outer peripheries of the trunnions are shaped into a convex spherical surface (a perfect spherical surface having the center of curvature on the trunnion axis); the rollers are mounted onto support rings via a plurality of needle rollers to constitute roller assemblies; and cylindrical inner peripheries of the support rings are fitted to the convex-spherical outer peripheries of the trunnions ~~(Japanese Patent Publication No. Hei 7-117108, Japanese Patent No. 2623216, etc.)~~. The plurality of needle rollers are arranged without any retainers, or in a so-called full complement state. According to this constitution, slides between the cylindrical inner peripheries of the support rings and the convex-spherical outer peripheries of the trunnions allow the tilting movements of the roller assemblies including the rollers.

Please amend the paragraphs bridging pages 8-10 of the Specification as follows:

In the constitution described above, the inner periphery of the support ring is shaped arcuate and convex in section. The outer periphery of each of the trunnions is shaped straight in longitudinal section, and formed in cross section so as to make contact with the inner periphery of the support ring in a direction perpendicular to the axis of the joint and create a clearance with the inner periphery of the support ring in an axial direction of the joint. The cross-sectional configuration of a trunnion such as makes contact with the inner periphery of the support ring in a direction perpendicular to the axis of the joint and creates a clearance with the inner periphery of the support ring in an axial direction of the joint translates into that the faces opposed to each other in the axial direction of the tripod member retreat toward each other, i.e., to smaller diameters than the diameter of an imaginary cylindrical surface. Concrete examples thereof include an ellipse ~~(claims 3-5)~~. For the sake of absorbing the tilt of the trunnions ascribable to nutations peculiar to tripod type constant velocity universal joints, the radius of curvature to the convex arcs of the support rings preferably has a value that allows the trunnions to make a tilt of the order of 2-3°.

The trunnions may be formed to have a cross section of generally elliptic shape with the major axis perpendicular to the axis of the joint. The generally elliptic shape is not limited to literal ellipses, and is intended to include those generally referred to as ovals and the like. More specifically, the configurations ~~as set forth in claims 4-6~~ can be adopted for the cross sections of the trunnions and the inner peripheries of the support rings so that the contact pressures against the support rings are relaxed and the trunnions are prevented

from a strength drop. Besides, as long as the operating angle falls within a predetermined angle range, the trunnions can tilt without inclining the support rings. This prevents the rollers from inclination and allows the rollers to roll smoothly on the roller guideways. There is provided no ribs which have sometimes been arranged on the track grooves in the outer joint member with an aim to restrain the inclination of the rollers. The omission of the ribs not only reduces the outer joint member in weight and simplifies the machining thereto, but eliminates slide resistance resulting from the slide contacts between the rollers and the ribs. This consequently achieves further reductions in slide resistance and induced thrust.

Please amend the paragraph bridging pages 12-13 of the Specification as follows:

To achieve the foregoing objects, the present invention also provides a constant velocity universal joint comprising: an outer joint member having three track grooves each having circumferentially-opposed roller guideways; a tripod member having three radially-projecting trunnions; a roller inserted in each of the track grooves; and a support ring mounted on each of the trunnions ~~o~~ to support the roller rotatably, the roller being movable in axial directions of the outer joint member along the roller guideways, wherein: the support ring has a cylindrical inner periphery; and the outer periphery of each of the trunnions is curved in longitudinal section, and formed in cross section so as to make contact with the inner periphery of the support ring in a direction perpendicular to the axis of the joint and create a clearance with the inner periphery of the support ring in an axial direction of the joint.

Please amend the paragraph bridging pages 14-15 of the Specification as follows:

More specifically, the trunnions can adopt such cross-sectional configurations ~~as set forth in claims 14-16~~ so that the contact pressures against the support rings are relaxed and the trunnions are prevented from a strength drop. Besides, the trunnions can tilt without inclining the support rings. This prevents the rollers from inclination and allows the rollers to roll smoothly on the roller guideways. As a result, it becomes possible to omit ribs which are sometimes arranged on the track grooves in the outer joint member with an aim to restrain the inclination of the rollers. The omission of the ribs not only reduces the outer joint member in weight and simplifies the machining thereto, but eliminates slide resistance resulting from the slide contacts between the rollers and the ribs. As a result, further reductions in slide resistance and induced thrust are achieved.

Please amend the paragraph bridging pages 37-38 of the Specification as follows:

To be more specific, the inner peripheries of the outer rollers may take a variety of configurations ~~described in Japanese Patent Laid-Open Publication No.Hei 9-14280 by the present applicant~~. Namely, the configurations the inner peripheries of the outer rollers may take include the following: the form of a cone gradually contacting in diameter toward the trunnion extremity; a concave spherical surface having a generatrix whose center falls off the center of generatrix of the trunnion's outer periphery toward the trunnion bottom ~~(the configuration shown in Fig. 3, Japanese Patent Laid-Open Publication No.Hei 9-14280)~~; a convex spherical surface having a generatrix whose center falls off the center of generatrix of the trunnion's outer periphery toward the trunnion extremity ~~(the configuration shown in Fig. 4, Japanese Patent Laid-Open Publication No.Hei 9-14280)~~; a composite surface of a

conical tapered surface contracting in diameter toward the trunnion extremity and a convex spherical surface ~~(the configuration shown in Fig. 5, Japanese Patent Laid-Open Publication No.Hei 9-14280)~~; and a composite surface of a cylindrical surface and a convex spherical surface ~~(the configuration shown in Fig. 9, Japanese Patent Laid-Open Publication No.Hei 9-14280)~~. Nevertheless, in favor of simplified fabrication processes, the inner peripheries of the outer rollers preferably have the form of a cone gradually contracting in diameter toward the trunnion extremity. In that case, the inner peripheries of the outer rollers desirably have a tilt angle of 0.1-3°, and preferably 0.1-1°, for the sake of effective reduction and stabilization of the induced thrusts.

Please amend the paragraph bridging pages 50-51 of the Specification as follows:

Figs. 1(A)-1(C) show a tripod type constant velocity universal joint according to a first embodiment of the present invention, Fig. 1(A) being a partially-sectioned end view of the same, Fig. 1(B) a sectional view perpendicular ~~erpendicular~~ to a trunnion, and Fig. 1(C) a sectional view of a support ring;

Please amend the second full paragraph on page 82 of the Specification as follows:

Additionally, the outer peripheries 22a of the trunnions 22 of the tripod member 20 and the roller guideways 14 in the outer joint member 10 may be provided with the ~~above-described~~ minute dimples and/or solid lubrication coatings having chemical conversion undercoatings. Cold sulfurizing is also applicable.

Please amend the first full paragraph on page 94 of the Specification as follows:

Note that the above-mentioned improvements through the optimizations in the material, surface, and subsurface properties of the component parts are not limited to

constant velocity universal joints having the constitutions of Figs. 18(A)-24(C), and may also be applied to constant velocity universal joints having the constitutions of Figs. 1(A)-17. In addition, the improvements are also applicable to the constant velocity universal joints comprising: roller guideways consisting of flat surfaces; outer rollers having cylindrical outer peripheries and concave-spherical inner peripheries; and inner rollers having convex-spherical outer peripheries, wherein slides between the concave-spherical inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers ~~(Japanese Patent Application Nos.Hei 8-4073 and 8-138335)~~. Likewise the constant velocity universal joints in which the roller guideways and the axes of the trunnions are configured not to be parallel to each other at an operating angle of 0° ~~(Japanese Patent Laid-Open Publication No.Hei 11-13779)~~.

Please amend the first full paragraph on page 107 of the Specification as follows:

Otherwise, in the constant velocity universal joint having the constitution shown in Figs. <u>8(A)-11(A) and</u> 18(A)-18(C), the tripod member 20 is made of steel material having a carbon content of 0.15-0.40% by weight, through the major processes of forging → machining → carbonitriding and tempering → grinding of the outer peripheries 22a of the trunnions 22. Here, the carbonitriding and tempering form surface portions (carbonitrided layers) directly beneath the surfaces of the tripod member 20. <u>See Figure 9(A) for an example.</u> The surface layers are limited to the range of $20 \leq \gamma R \leq 40$ in residual austenite content γR (vol%). Incidentally, the surface layers (carbonitrided layers) have only to be formed at least beneath the outer peripheries 22a of the trunnions 22. In the present

embodiment, the outer peripheries 22a of the trunnions 22 and other surfaces of the completed tripod member 20 is limited to the range of $705 < R \leq 820$, and preferably $710 < R \leq 810$, in softening resistance characteristic value R.

Please amend the paragraph bridging pages 107 and 108 of the Specification as follows:

In this connection, the carbonitriding and tempering in the processes described above may be replaced with carburizing and tempering while, as shown in the exemplary embodiment of Figure 9(A), the surface layers (carburized layers) formed by the carburizing and tempering are limited to the range of $20 \leq \gamma R \leq 40$ in residual austenite content γR (vol%).

Please amend the second full paragraph on page 108 of the Specification as follows:

The support rings 32, the rollers 34, and the needle rollers 36 which constitute the roller assemblies are made of steel material having a carbon content of 0.95-1.10% by weight, such as SUJ2 and other bearing steels, through the major processes of forging → machining → nitriding and tempering → grinding. Here, as shown in the exemplary embodiment of Figure 9(A), the nitriding and tempering create nitride layers (layers having nitride solid solution) as surface portions directly beneath the surfaces of these component parts. The surface portions are limited to the range of $20 \leq \gamma R \leq 40$ in residual austenite content γR (vol%). In other respects including the materials and fabrication processes, these component parts may conform to the tripod member 20 and the outer joint member 10 described above.

Please amend the paragraph on page 110, lines 7-23 of the Specification as follows:

The above-mentioned improvements through the optimizations in the material and surface properties of the component parts are not limited to constant velocity universal joints having the constitutions of Figs. 18(A)-24(C), and may also be applied to constant velocity universal joints having the constitutions of Figs. 1(A)-17. In addition, the improvements are also applicable to the constant velocity universal joints comprising: roller guideways consisting of flat surfaces; outer rollers having cylindrical outer peripheries and concave-spherical inner peripheries; and inner rollers having convex-spherical outer peripheries, wherein slides between the concave-spherical inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers ~~(Japanese Patent Application Nos. Hei 8-4073 and 8-138335)~~. Likewise the constant velocity universal joints in which the roller guideways and the axes of the trunnions are configured not to be parallel to each other at an operating angle of 0° ~~(Japanese Patent Laid-Open Publication No. Hei 11-13779)~~.

Please amend the paragraph bridging pages 113-114 of the Specification as follows:

Here, the above-mentioned carbide consists mainly of Fe_3C, to be more specific. The structure having such a carbide distributed into its martensite matrix can be formed by providing at least the surface layers with carbon C as much as or more than its eutectic point (0.8% by weight or higher), and subjecting the same to hardening and tempering. In particular, spheroidizing can be performed in the forming process of the parts, or appropriate adjustments can be made to the component contents of the steel material and to the heat treatment conditions so that the above-mentioned carbide ~~car~~ <u>can be</u>

spheroidized for yet preferable results.

Please amend the paragraph bridging pages 115-116 of the Specification as follows:

The above-described improvements through the optimizations in the material and surface properties of the component parts are not limited to constant velocity universal joints having the constitution of Figs. 18(A)-18(C), and may also be applied to constant velocity universal joints having the constitutions of Figs. 20(A)-24(B) and to constant velocity universal joints having the constitutions of Figs. 1(A)-17. In addition, the improvements are also applicable to the constant velocity universal joints comprising: roller guideways consisting of flat surfaces; outer rollers having cylindrical outer peripheries and concave-spherical inner peripheries; and inner rollers having convex-spherical outer peripheries, wherein slides between the concave-spherical inner peripheries of the outer rollers and the convex-spherical outer peripheries of the inner rollers permit the tilting movements of the outer rollers ~~(Japanese Patent Application Nos. Hei 8-4073 and 8-138335)~~. Likewise the constant velocity universal joints in which the roller guideways and the axes of the trunnions are configured not to be parallel to each other at an operating angle of 0° ~~(Japanese Patent Laid-Open Publication No. Hei 11-13779)~~.